STIC Search Report
EIC 2100

USPTO

STIC Database Tracking Number: 148031

TO: Susan F Rayyan **Location: RND 3C05** **Art Unit : 2167** **Thursday, March 17, 2005** **Case Serial Number: 09/934093**	**From: David Holloway** **Location: EIC 2100** **RND 4B19** **Phone: 2-3528** **david.holloway@uspto.gov**

Search Notes

Dear Examiner Rayyan,

Attached please find your search results for above-referenced case.
Please contact me if you have any questions or would like a re-focused search.

David

sira
Search and Information Resources Administration

STIC EIC 2100
Search Request Form

Today's Date: March 17, 2005

What date would you like to use to limit the search?
Priority Date: 8/25/00 Other:

Name Susan Rayyan
AU 2167 Examiner # 77889
Room # 3C-05 Phone 24117
Serial # 09/934,093

Format for Search Results (Circle One):
PAPER DISK EMAIL

Where have you searched so far?
USP DWPI EPO JPO ACM IBM TDB
IEEE INSPEC SPI Other _____

Is this a "Fast & Focused" Search Request? (Circle One) YES NO
A "Fast & Focused" Search is completed in 2-3 hours (maximum). The search must be on a very specific topic and meet certain criteria. The criteria are posted in EIC2100 and on the EIC2100 NPL Web Page at http://ptoweb/patents/stic/stic-tc2100.htm.

What is the topic, novelty, motivation, utility, or other specific details defining the desired focus of this search? Please include the concepts, synonyms, keywords, acronyms, definitions, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract, background, brief summary, pertinent claims and any citations of relevant art you have found.

Title: Automatic community formation for phone and computer network

Inventor: Daniel Burnstein et al

Method of formulation of electronic communities

- database stores user id / search string
- determine search string match
- ques user whether to join community or form community
- initial anonymous -
- ~~conducting~~ creating community or inviting to join

cybercommunities
Forums
List services
electronic communities
Tripod.com
Geosites.com
online communities
- web communities
chat rooms
bulletin boards
Motley Fool
Yahoo clubs
usnet Newsgroups
IRC
Pics online
PC Board

STIC Searcher David Holloway Phone 2-3528
Date picked up 5-17-05 Date Completed 3-17-05

Search and Information Resources Administration

```
Set     Items   Description
S1     119009   SEARCH? OR QUERY? OR SURFING? OR BROWSING OR QUERIES
S2    6620716   CREATE? OR CREATING OR FORM OR BUILD? OR MODIF? OR CONSTRU-
            CT? OR START? OR ADD OR FORMING OR FORMS OR DEVELOP?
S3    2150379   INVITE? OR ASK OR REQUEST? OR CONTACT? OR MATCH? OR EMAIL -
            OR (E OR ELECTRONIC)()(MAIL? OR MESSAG?)
S4      22967   (E OR ELECTRONIC OR ON()LINE OR CYBER OR VIRTUAL OR ONLINE
            OR INTERNET OR WEB OR WWW OR CYBERSPACE)(2N)(GATHERING OR COM-
            MUNITY OR COMMUNITIES OR GROUP OR GROUPS OR CLUB OR FORUMS) OR
             BBS OR BULLETIN()BOARD? OR CHAT()(GROUP? OR ROOM?)
S5       9891   S4 AND (S2 OR GENERAT?)
S6        213   S5 AND S1
S7         83   S6 AND S3
S8         74   S7 AND IC=(G06F? OR H04L?)
S9         92   S6 NOT AD=20000825:20030825
S10        87   S9 NOT AD=20030825:20050401
S11        29   S8 AND S10
S12      1036   S4(5N)(S2 OR GENERAT?)
S13         5   S11 AND S12
S14        24   S6 AND (SUBJECT? OR TOPIC? OR INTEREST? OR PROFESSION? OR -
             HOBBY OR HOBBIES OR AVOCATION? OR VOCATION?)
S15         5   S14 NOT AD=20000825:20030824
S16         4   S15 NOT AD=20030824:20050301
S17       116   S12 AND (SUBJECT? OR TOPIC? OR INTEREST? OR PROFESSION? OR
             HOBBY OR HOBBIES OR AVOCATION OR SPECIALI?)
S18        27   S17 AND IC=(G06F? OR H04L?)
S19        26   S18 NOT S13
S20         8   S19 NOT AD=2000825:20030825
S21         8   S20 NOT AD=20030825:20050401
S22       121   S12 AND IC=(G06F-015? OR H04L?)
S23        67   S22 NOT AD=20000825:20030825
S24        66   S23 NOT AD=20030825:20050401
S25        25   S24 AND (AUTOMATE? OR AUTOMATIC OR SOFTWARE? OR APPLICATIO-
             N? OR TOOL? ? OR PROGRAM? OR SCRIPT? OR CODE?)
S26        23   S25 NOT (S21 OR S16 OR S13)
S27        23   IDPAT (sorted in duplicate/non-duplicate order)
S28        23   IDPAT (primary/non-duplicate records only)
File 347:JAPIO Nov 1976-2004/Nov(Updated 050309)
         (c) 2005 JPO & JAPIO
File 350:Derwent WPIX 1963-2005/UD,UM &UP=200518
         (c) 2005  Thomson Derwent
```

13/5/1 (Item 1 from file: 347)
DIALOG(R)File 347:JAPIO

07138900 **Image available**
COMMUNICATION SERVICE SYSTEM

PUB. NO.: 2002-007272 [JP 2002007272 A]
PUBLISHED: January 11, 2002 (20020111)
INVENTOR(s): NAGAMINE NAOSUKE
APPLICANT(s): SUKAIBANANA ENTERTAINMENT KK
APPL. NO.: 2000-183831 [JP 2000183831]
FILED: June 19, 2000 (20000619)
INTL CLASS: **G06F-013/00** ; **G06F-017/60** ; **H04L-012/54** ; **H04L-012/58**

ABSTRACT

PROBLEM TO BE SOLVED: To provide a system which mediates in specifying and selecting of a person concerned by a **bulletin board** and **contacting** method, having area, real-time, anonymousness, and purpose properties between an unspecified person who wishes to make **contact** and an unspecified person to be **contacted** .

SOLUTION: When a user terminal accesses a service server to write a message, the service server **requests** the user terminal to select a **contact** means of at least mail, a real-time chat, or a voice message, set the terms of the validity of the message, and selects a desired genre and also **requests** the terminal to send a message body; and the message text received from the user terminal is classified into the corresponding genre and recorded in a **bulletin board** database together with the term of validity and **contacting** means. When the user terminal gains access for message **browsing** , the user terminal is **requested** to select a desired genre, and all messages corresponding to the desired genre received from the user terminal are extracted from the **bulletin board** database to **generate bulletin board** information, which is displayed on the user terminal.

13/5/2 (Item 2 from file: 347)
DIALOG(R)File 347:JAPIO

05780492 **Image available**
METHOD FOR **GENERATING** ELECTRONIC COMMUNICATION SYSTEM BY SYSTEM FOR DATA CONVERSION BETWEEN WWW DATA AND **ELECTRONIC MAIL** DATA

PUB. NO.: 10-063592 [JP 10063592 A]
PUBLISHED: March 06, 1998 (19980306)
INVENTOR(s): OSAKA AKIHIRO
TAKAHASHI KIYOMI
APPLICANT(s): AKI UEBU AGENCY KK [000000] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 08-246797 [JP 96246797]
FILED: August 13, 1996 (19960813)
INTL CLASS: [6] **G06F-013/00** ; **H04L-012/54** ; **H04L-012/58**
JAPIO CLASS: 45.2 (INFORMATION PROCESSING -- Memory Units); 44.3 (COMMUNICATION -- Telegraphy)

ABSTRACT

PROBLEM TO BE SOLVED: To join in a multimedia electronic **bulletin board** by using the mechanism of an **electronic mail** system (**E - Mail**) when sending data to be posted onto a **bulletin board** and the mechanism of the multimedia electronic **bulletin board** system(WWW) when posting and **browsing** the data.

SOLUTION: **Electronic mail** data are processed distinctively by two systems which are a **generation** system and a management system. An **electronic mail** data analysis part 4 for multimedia electronic **bulletin board** constitution of the **generation** system **generates** a file group in format which can be displayed through a WWW browser to **generate** a multimedia electronic **bulletin board** constitution file **group** . An **electronic mail** data analysis part 10 for multimedia electronic **bulletin board** management of the management system, on the other hand, operates files in multimedia electronic **bulletin board** constitution file group 14 according to the contents of the management command definition part 13 to manages the multimedia **bulletin board** . Thus, the multimedia electronic **bulletin board** which can easily be used in common to information origination is **created** .

13/5/4 (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX

013385467 **Image available**
WPI Acc No: 2000-557405/200051
Related WPI Acc No: 1996-278122; 1998-311901; 1998-311902; 1999-008998; 2001-182386; 2001-502180; 2003-196692
XRPX Acc No: N00-412441

Data updating method for user interactive electronic information providing system in Internet, involves generating **virtual** search **objects relevant to user's interest and** bulletin board **is scanned to classify users**

Patent Assignee: HERZ F S M (HERZ-I)
Inventor: HERZ F S M
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6029195	A	20000222	US 94346425	A	19941129	200051	B
			US 9632461	P	19961209		
			US 97985731	A	19971205		

Priority Applications (No Type Date): US 9632461 P 19961209; US 94346425 A 19941129; US 97985731 A 19971205
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6029195	A		63	G06F-015/16	CIP of application US 94346425 Provisional application US 9632461 CIP of patent US 5758257

Abstract (Basic): US 6029195 A

NOVELTY - Target profiles are **generated** relevant to contents of target **bulletin boards** . The user preferred data is retrieved for each user, using the profiles. Virtual **search** objects relevant to user are **generated** . Each **bulletin board** is scanned relevant to target object and user groups are classified depending on their interests.

DETAILED DESCRIPTION - The user groups having common interest of particular object data is identified. Then, the identified user is **matched** with the other users for **creating** a new **bulletin board** . The **matched** user group is **generated** as **E - mail** list and the list is forwarded to the concerned user. The new users relevant to the new **bulletin board** are added in the user's list.

USE - For user interactive electronic information providing system in Internet used in providing news, advertisements and various data. Also used in TV broadcasting, advertisement research and for on-line video conferencing used for business, schools and job training purposes.

ADVANTAGE - Facilitates accessing of desired data with less accessing time, by **modifying** the electronic **bulletin boards** periodically. Eases editing of documents in online conferencing, thereby promotes product design and operativity.

DESCRIPTION OF DRAWING(S) - The figure shows the flow chart representing the user interactive data accessing method.

pp; 63 DwgNo 10/16

Title Terms: DATA; UPDATE; METHOD; USER; INTERACT; ELECTRONIC; INFORMATION; SYSTEM; **GENERATE** ; VIRTUAL; **SEARCH** ; OBJECT; RELEVANT; USER; INTEREST; BOARD; SCAN; CLASSIFY; USER
Derwent Class: T01; W02
International Patent Class (Main): **G06F-015/16**
International Patent Class (Additional): H04H-001/02; H04N-007/14
File Segment: EPI

28/5/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

016098052 **Image available**
WPI Acc No: 2004-255928/200424
XRPX Acc No: N04-203380

Automated **web site creation and access system has web access module for generating and presenting listings of all community of practice websites, in which access is provided to community of practice websites upon selection from listings**

Patent Assignee: QWEST COMMUNICATIONS INT INC (QWES-N)
Inventor: KENYON J D
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6701343	B1	20040302	US 99452526	A	19991201	200424	B

Priority Applications (No Type Date): US 99452526 A 19991201
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6701343	B1		16	G06F-015/16	

Abstract (Basic): US 6701343 B1

NOVELTY - The system has a web access module for generating and presenting one or more listings of all the community of practice websites including status information for each of the community of practice websites. Access is provided to one or more of the community of practice websites upon selection from the listings.

DETAILED DESCRIPTION - A website generator enters the custom information into the templates included in a database to generate the community of practice websites, and stores the community of practice websites in another database. Each of the community websites is of standardized format including several automatically linked web pages. An interface, accessible over a data network, is configured to receive custom information for creating the community of practice websites. INDEPENDENT CLAIMS are included for the following:

(a) Community of practice server; and

(b) **Creating** and providing access to a **community web** site on a web-based server.

USE - For simplified **generation** of **community** practice **web** pages which are accessible and updateable by a number of parties.

ADVANTAGE - Enables system user to enter minimal amount of information to create a website which is accessible and updateable by other members of the community of practice. Constructs a website in such a manner that after a predetermined period of non-use, it may be placed in an archive until revived at a selected point in time. Provides a system that is connectable to the Internet, an intranet or extranet to provide functions such as creating, viewing or updating of websites. Configures a newly created website to provide for unlimited access over the network or security features may be employed to limit access.

DESCRIPTION OF DRAWING(S) - The figure shows the system diagram for the community of practice server.

pp; 16 DwgNo 1/10

Title Terms: **AUTOMATIC** ; WEB; SITE; CREATION; ACCESS; SYSTEM; WEB; ACCESS; MODULE; GENERATE; PRESENT; COMMUNAL; PRACTICE; ACCESS; COMMUNAL; PRACTICE ; SELECT
Derwent Class: T01
International Patent Class (Main): **G06F-015/16**
File Segment: EPI

28/5/2 (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014402911 **Image available**
WPI Acc No: 2002-223614/200228
Method for automatically creating community **in** internet community **service**
Patent Assignee: HAHMO.COM CO LTD (HAHM-N); LOCUS DIGITAL SERVICE JH (LOCU-N)
Inventor: YOON J H
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
KR 2001097753	A	20011108	KR 200022100	A	20000426	200228	B
KR 372951	B	20030225	KR 200022100	A	20000426	200353	

Priority Applications (No Type Date): KR 200022100 A 20000426
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
KR 2001097753	A		1	G06F-015/16	
KR 372951	B			G06F-015/16	Previous Publ. patent KR 2001097753

Abstract (Basic): KR 2001097753 A
NOVELTY - A method for automatically **creating** a **community** in an **Internet community** service is provided to increase a competitiveness compared with other site providing a uniform Internet community service by progressing very rapidly a community creation in contrast to an existing process.
DETAILED DESCRIPTION - A database of a web server stores a set community grouping and a detail item by each community grouping(S310,S320). In case that a user connecting through an Internet requests an entrance to the community service and an renewal of registered contents, the web server receives user information from the user(S330,S340). The web server receiving the user information automatically registers it by the detail item about each community grouping(S350 to S380).
pp; 1 DwgNo 1/10
Title Terms: METHOD; **AUTOMATIC** ; COMMUNAL; COMMUNAL; SERVICE
Derwent Class: T01
International Patent Class (Main): **G06F-015/16**
File Segment: EPI

28/5/4 (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX

013414040 **Image available**
WPI Acc No: 2000-585978/200055
XRPX Acc No: N00-433553
Collaboration backbone for web-based collaborative systems, downloads demon logic at clients and forms collaborative sessions of interactive applications , based on system state maintained by server
Patent Assignee: UNIV SYRACUSE (UYSY-N)
Inventor: BECA L; CHENG G; FOX G C; JURGA T; OLSZEWSKI K; PODGORNY M; SOKOLOWSKI P; WALCZAK K
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6078948	A	20000620	US 9817840	A	19980203	200055	B

Priority Applications (No Type Date): US 9817840 A 19980203
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6078948	A		29	G06F-015/163	

Abstract (Basic): US 6078948 A

NOVELTY - The client (210) includes demon (220) embedded in room page, to identify server (240) for receiving and forwarding messages routed to relevant entity based on message information. The server maintains system state including associations identifying demons, based on which demon logic is downloaded at respective clients and collaborative session of interacting instances of **applications** (230,235) is formed.

DETAILED DESCRIPTION - The demon identifies, downloads and launches control logic (225) associated with room page and establishes a communication path between downloaded demon and downloaded control logic. The demon also identifies and launches an **application** and establishes a communication path between the downloaded demon and the launched **application** . An INDEPENDENT CLAIM is also included for the method of forming collaborative session of interacting instances of **application** in virtual mode.

USE - For **forming web** -based **virtual communities** having **virtual** rooms with collaborative sessions e.g. for chat rooms, shared white boards, etc.

ADVANTAGE - Provides a powerful vehicle for distributing collaborative **applications** . Provides a flexible design for the development of new collaborative **applications** and for porting of old **applications** into collaborative versions. Allows maximum flexibility of floor control and session management.

DESCRIPTION OF DRAWING(S) - The figure shows the system architectural diagram of collaboration backbone.

Client (210)
Demon (220)
Control logic (225)
Applications (230,235)
Server (240)
pp; 29 DwgNo 2/14

Title Terms: BACKBONE; WEB; BASED; SYSTEM; LOGIC; CLIENT; FORM; SESSION; INTERACT; APPLY; BASED; SYSTEM; STATE; MAINTAIN; SERVE
Derwent Class: T01
International Patent Class (Main): **G06F-015/163**
File Segment: EPI

28/5/13 (Item 13 from file: 347)
DIALOG(R)File 347:JAPIO

06171005 **Image available**
METHOD AND SYSTEM FOR ASSISTING **GENERATION** AND ACTIVITY OF **ELECTRONIC COMMUNITY** SUPPORTING AND STORAGE MEDIUM STORING ASSISTING **PROGRAM** FOR **GENERATION** AND ACTIVITY OF **ELECTRONIC COMMUNITY**

PUB. NO.: 11-112552 [JP 11112552 A]
PUBLISHED: April 23, 1999 (19990423)
INVENTOR(s): MIZOGUCHI YOICHI
YOSHIMI HIROYUKI
MAGOORI AKIHIRO
KATO TETSUYA
APPLICANT(s): NIPPON TELEGR & TELEPH CORP <NTT>
APPL. NO.: 09-268783 [JP 97268783]
FILED: October 01, 1997 (19971001)
INTL CLASS: **H04L-012/54** ; **H04L-012/58** ; G06F-013/00

ABSTRACT

PROBLEM TO BE SOLVED: To considerably simplify the procedure of a manager and to considerably reduce time required for work by associatively displaying log information on the transmission/reception of an electric mail, an electronic mail to be responded and a response electronic mail in a tree form on a home page.

SOLUTION: A mailing list generation means 220 generates a mailing list based on inputted mailing list generation information. A home page generation means 240 generates the community home page based on home page generation information for displaying the log of the mailing list. A log recording means 280 records the log on the electronic mail which a user transmits/receives in accordance with the mailing list. A home page transmission means 202 transmits and displays a relation between the recorded log and the transmitted/received electronic mail to a user terminal 100 by adding it to the home page generated by compiling it in the tree form.

28/5/14 (Item 14 from file: 347)
DIALOG(R)File 347:JAPIO

05895344 **Image available**
ELECTRONIC BULLETIN BOARD SYSTEM

PUB. NO.: 10-178444 [JP 10178444 A]
PUBLISHED: June 30, 1998 (19980630)
INVENTOR(s): TOKUMURA TATSUMI
APPLICANT(s): FUJI XEROX CO LTD [359761] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 08-338312 [JP 96338312]
FILED: December 18, 1996 (19961218)
INTL CLASS: [6] **H04L-012/54** ; **H04L-012/58** ; G06F-003/14; G06F-003/14; G06F-013/00; G06F-013/00
JAPIO CLASS: 44.3 (COMMUNICATION -- Telegraphy); 36.4 (LABOR SAVING DEVICES -- Service Automation); 44.2 (COMMUNICATION -- Transmission Systems); 44.4 (COMMUNICATION -- Telephone); 45.2 (INFORMATION PROCESSING -- Memory Units); 45.3 (INFORMATION PROCESSING -- Input Output Units); 45.4 (INFORMATION PROCESSING -- Computer **Applications**)

ABSTRACT

PROBLEM TO BE SOLVED: To provide an electronic bulletin board system in which even a personal computer or the like as required refers to a content of bulletin board information displayed on an electronic bulletin board using a large sized display device and information server confirms the content of the bulletin board information on an optional date in the past or in the future.

SOLUTION: A **bulletin board** information **generator** 100 is provided with a **bulletin board** information storage means 111a to **add** attribute information to the **bulletin board** information and stores the result and a conversion means 113b that classifies the stored bulletin board based on the attribute information and converts periodically the classified **bulletin board** information into at least two **forms** of files. The electronic **bulletin board** system 200 is provided with a selection means 211a that selects desired bulletin board information from a plurality of the converted files periodically or according to a request of a user, a transfer means 211b that transfers the selected bulletin board information to the electronic bulletin board 200 and a display means 212a that displays the transferred bulletin board information on an input output terminal 230.

```
Set     Items   Description
S1     712481   SEARCH? OR QUERY? OR SURFING? OR BROWSING OR QUERIES
S2   16216941   CREATE? OR CREATING OR FORM OR BUILD? OR MODIF? OR CONSTRU-
             CT? OR START? OR ADD OR FORMING OR FORMS OR GENERATE? OR GENE-
             RATING OR DEVELOP?
S3    1787182   INVITE? OR ASK OR REQUEST? OR CONTACT? OR MATCH? OR EMAIL -
             OR (E OR ELECTRONIC)()(MAIL? OR MESSAG?)
S4      49508   (E OR ELECTRONIC OR ON()LINE OR CYBER OR VIRTUAL OR ONLINE
             OR INTERNET OR WEB OR WWW OR CYBERSPACE)(2N)(GATHERING OR COM-
             MUNITY OR COMMUNITIES OR GROUP OR GROUPS OR CLUB OR FORUMS) OR
              BBS OR BULLETIN()BOARD? OR CHAT()(GROUP? OR ROOM?)
S5        130   S1 AND S2(3N)S4 AND S2
S6         32   S5 AND (SUBJECT? OR TOPIC? OR INTEREST? OR PROFESSION? OR -
             HOBBY OR HOBBIES OR AVOCATION? OR VOCATION?)
S7         22   RD (unique items)
S8        174   S1 AND S2 AND S3 AND S4
S9         98   S4(2N)S2 AND S1
S10        62   S8 AND (SUBJECT? OR HOBBY OR HOBBIES OR INTEREST? OR TOPIC
             OR TOPICS OR PROFESSION? OR AVOCATION?)
S11       156   S10 OR S7 OR S9
S12       130   RD (unique items)
S13        68   S12 NOT PY>2000
S14        37   S13 AND (AUTOMATE? OR AUTOMATIC OR SCRIPT? OR SOFTWARE? OR
              PROGRAM? OR APPLICATION? OR TOOL OR TOOLS OR CODE)
File   8:Ei Compendex(R) 1970-2005/Mar W1
         (c) 2005 Elsevier Eng.  Info. Inc.
File  35:Dissertation Abs Online 1861-2005/Feb
         (c) 2005 ProQuest Info&Learning
File  65:Inside Conferences 1993-2005/Mar W2
         (c) 2005 BLDSC all rts. reserv.
File   2:INSPEC 1969-2005/Feb W4
         (c) 2005 Institution of Electrical Engineers
File  94:JICST-EPlus 1985-2005/Jan W5
         (c)2005 Japan Science and Tech Corp(JST)
File 111:TGG Natl.Newspaper Index(SM) 1979-2005/Mar 16
         (c) 2005 The Gale Group
File   6:NTIS 1964-2005/Mar W1
         (c) 2005 NTIS, Intl Cpyrght All Rights Res
File 144:Pascal 1973-2005/Mar W1
         (c) 2005 INIST/CNRS
File  34:SciSearch(R) Cited Ref Sci 1990-2005/Mar W2
         (c) 2005 Inst for Sci Info
File  99:Wilson Appl. Sci & Tech Abs 1983-2005/Feb
         (c) 2005 The HW Wilson Co.
File  95:TEME-Technology & Management 1989-2005/Feb W1
         (c) 2005 FIZ TECHNIK
```

14/5/2 **(Item 2 from file: 8)**
DIALOG(R)File 8:Ei Compendex(R)

02649555 E.I. Monthly No: EI8810094099
Title: ONLINE AID FOR MICRO MALFUNCTIONS: ONLINE SOURCES OF HARDWARE AND SOFTWARE SUPPORT.
Author: O'Leary, Mick
Corporate Source: Data Brokers, Myersville, MD, USA
Source: Database v 11 n 2 Apr 1988 p 102-104
Publication Year: 1988
CODEN: DTBSDQ ISSN: 0162-4105
Language: English
Document Type: JA; (Journal Article) Treatment: G; (General Review)
Journal Announcement: 8810
Abstract: This paper describes the newest **form** of micro product support, the online support service, which offers so many advantages that it is well on its way to supplanting all the others. This support method is a variation on the **online** user **group** that has been popular on the consumer databanks for close to a decade. **Online** user **groups** , also called Special **Interest** Groups, SIG's, or **Forums** , combine **electronic mail** , conferencing, uploading, downloading, and online **searching** into an efficient and practical means of information exchange. When applied to product support, they permit prompt, authoritative, and personalized responses to almost any question. Although there are many individual variations, online support services maintain the two principal elements of the **online** user **group** : a **bulletin board** for current messages, and an archive containing a variety of **programs** and text files. At its simplest, product users send questions by **electronic mail** to the **bulletin board** , where company technicians in turn post answers. 9 refs.
Descriptors: *COMPUTERS, MICROCOMPUTER--*Maintenance; INFORMATION SERVICES; **ELECTRONIC MAIL**
Identifiers: ONLINE AID; MICRO MALFUNCTIONS; ONLINE HARDWARE SUPPORT; ONLINE **SOFTWARE** SUPPORT; INFORMATION EXCHANGE
Classification Codes:
722 (Computer Hardware); 723 (Computer Software); 903 (Information Science)
72 (COMPUTERS & DATA PROCESSING); 90 (GENERAL ENGINEERING)

14/5/5 (Item 2 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01703771 ORDER NO: AAD99-32119

WEB OF WISDOM: A FIELD STUDY OF A VIRTUAL LEARNING COMMUNITY (INTERNET)

Author: COX, RUTH M.

Degree: PH.D.
Year: 1999
Corporate Source/Institution: INSTITUTE OF TRANSPERSONAL PSYCHOLOGY (0669)
Chairperson: JENNY WADE
Source: VOLUME 60/05-A OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 1520. 330 PAGES
Descriptors: EDUCATION, TECHNOLOGY ; PSYCHOLOGY, SOCIAL ; SOCIOLOGY, SOCIAL STRUCTURE AND DEVELOPMENT ; EDUCATION, SOCIOLOGY OF
Descriptor Codes: 0710; 0451; 0700; 0340

The Internet creates a unique opportunity for **building virtual** learning **communities** . This field study investigated the experiences of 12 adults engaged in a computer-mediated education **program** using an asynchronous online conference. To reveal what fostered meaningful discourse and transformative learning, the study used an ethnographic participant-observation approach supported by interpretation of online transcripts, fieldnotes, a focus group discussion, questionnaires, and phone interviews. Participants explored aspects of their psychological and spiritual development, sharing their life stories through creative writing and imagery, online and in person for one year. Personal storytelling and virtual group discourse revealed examples of transpersonal experiences, in which the participant's sense of self-identity extended beyond (trans) the individual or personal to encompass wider aspects of relatedness to others, the natural world, or the cosmos. Participants reported the importance of pace and flow in online discourse as well as a sense of immersive presence. Sustained online discourse was found to be crucial in observing participatory thought and creating a supportive structure for collaborative learning. Seven key elements that fostered transformative learning are: (1) Combine face-to-face meetings with virtual presence; (2) Establish the container with attention to community size, structure, tone, and intention; (3) Structure the community to be self-creating, self-maintaining, and self-defining through flexible curriculum design and whole-group learning; (4) Encourage the development of in-the-moment self awareness, mindfulness, and immersive presence; (5) Guide risk-taking through shared feelings, life experiences, and reclaimed projections; (6) Welcome humor, improvisation, and creative expression; (7) Share the **search** for meaning: See all of life and education as a transformational journey. Detailed descriptions of **program** development, structure, facilitation, and curriculum are offered that could be applied to a range of different lifelong learning settings.

14/5/11 (Item 1 from file: 2)
DIALOG(R)File 2:INSPEC

6938174 INSPEC Abstract Number: C2001-07-7250N-004
Title: Web search **gets personalized**
Author(s): Chakrabarti, S.; Gurushayam, H.
Author Affiliation: Dept. of Comput. Sci. & Eng., IIT, Mumbai, India
Journal: Vivek vol.13, no.2 p.3-16
Publisher: Ms Truptee C Shah for Natl. Centre Software Technol,
Publication Date: April 2000 Country of Publication: India
CODEN: VIVFE5 ISSN: 0970-8618
SICI: 0970-8618(200004)13:2L.3:SGP;1-9
Material Identity Number: P856-2001-002
Language: English Document Type: Journal Paper (JP)
Treatment: General, Review (G)
Abstract: **Matching** the information needs of Internet users with the content on the Web demands better modeling of the needs of the users. **Searching** the explosive content on the Internet merely with keywords is not a smart solution. Keyword-based **searches** and other traditional methods will soon give way to efficient information-foraging **tools** . Even the largest **search** engines cannot keep pace with the scaling up of the Web. Moreover, the "one-size-fits-all **search** " must yield to user-adaptive **searches** , which learn from the past behavior of users and communities. This paper introduces the fascinating technologies that are making their way into hypertext information management products. We review research prototypes and upcoming products and services in this space. Can useful but hidden information on the Internet, like **topic** -specific **communities** and **e - groups** with specific **interests** be mined out of the plethora of pages and links on the Web, thus **forming** a "vertical portal"? Can the profile of the user and his **interest** areas be used to address his **queries** better than with keywords alone? Recent research seems to suggest that the structure and content of the Web may permit performing the above tasks mostly automatically. (9 Refs)
Subfile: C
Descriptors: hypermedia; information needs; information resources; Internet; personal information systems; **search** engines; user modelling
Identifiers: personalized Web **searching** ; information needs; Internet users; World Wide Web content; keyword-based **searches** ; information foraging **tools** ; **search** engines; user-adaptive **searches** ; past user behavior; user communities; hypertext information management products; research prototypes; **topic** -specific communities; **electronic groups** ; **interest** groups; vertical portal; user profile; user **interests** ; **queries**
Class Codes: C7250N (Search engines); C7210N (Information networks); C6170K (Knowledge engineering techniques); C6180 (User interfaces); C7220 (Generation, dissemination, and use of information)

14/5/16 (Item 6 from file: 2)
DIALOG(R)File 2:INSPEC

6084558 INSPEC Abstract Number: B9812-6210L-129, C9812-5620W-069
Title: The use of Internet-based technologies-beyond e - mail and search engines
Author(s): Lockhead, S.
Author Affiliation: Kaman Ind. Technol., Tonawanda, NY, USA
Conference Title: IEMC '98 Proceedings. International Conference on Engineering and Technology Management. Pioneering New Technologies: Management Issues and Challenges in the Third Millennium (Cat. No.98CH36266) p.316-21
Editor(s): Peters, L.S.
Publisher: IEEE, New York, NY, USA
Publication Date: 1998 Country of Publication: USA viii+555 pp.
ISBN: 0 7803 5082 0 Material Identity Number: XX98-02838
U.S. Copyright Clearance Center Code: 0 7803 5082 0/98/$10.00
Conference Title: IEMC '98 Proceedings. International Conference on Engineering and Technology Management. Pioneering New Technologies: Management Issues and Challenges in the Third Millennium
Conference Sponsor: IEEE Eng. Manage. Soc
Conference Date: 11-13 Oct. 1998 Conference Location: San Juan, PR, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Applications (A); Practical (P)
Abstract: With the continuing explosive growth of the world wide web and the Internet, there are many opportunities to use these technologies to enhance our ability to function in an engineering and a management capacity. Most of the emphasis relates to the world wide web and **developing** websites based on the latest and greatest **programming** languages and **tools** . There is also a great **interest** in information processing, centered around using **search** engines and push technologies. Although **e - mail** has been part of the Internet experience since the very early days, it has evolved into an effective communications **tool** . However, there are still opportunities to use the Internet to become more effective in communication, project management, general management, and content-specific information exchange. There are companies that provide services to the **on - line community** that allow for the interaction of two or more people in real-time in a number of fashions. Some of the possible actions include: on-line and off-line messaging, multi-user chatting, real-time file and URL transfer, notification of other users currently on-line, Internet phone facilitation, and message history logging. Some of these services are free to the user, while others charge for the technology. The discussion of one **program** 's capabilities **generates** ideas for how the technology can make engineers and managers more effective. (0 Refs)
Subfile: B C
Descriptors: **electronic messaging** ; Internet; project management
Identifiers: Internet-based technologies; world wide web; management; engineering; information processing; **search** engines; push technologies; **e - mail** ; communications **tool** ; project management; general management; content-specific information exchange; **on - line community** ; off-line messaging; multi-user chatting; real-time file; URL transfer; Internet phone facilitation; message history logging
Class Codes: B6210L (Computer communications); B0140 (Administration and management); B0170C (Project and design engineering); C5620W (Other computer networks)

14/5/19 (Item 9 from file: 2)
DIALOG(R)File 2:INSPEC

5165754 INSPEC Abstract Number: C9603-6170K-003
Title: Auto-FAQ: an experiment in cyberspace leveraging
Author(s): Whitehead, S.D.
Author Affiliation: GTE Labs. Inc., Waltham, MA, USA
Journal: Computer Networks and ISDN Systems Conference Title: Comput. Netw. ISDN Syst. (Netherlands) vol.28, no.1-2 p.137-46
Publisher: Elsevier,
Publication Date: Dec. 1995 Country of Publication: Netherlands
CODEN: CNISE9 ISSN: 0169-7552
SICI: 0169-7552(199512)28:1/2L.137:AECL;1-5
Material Identity Number: I876-95011
U.S. Copyright Clearance Center Code: 0169-7552/95/$09.50
Conference Title: Second International World-Wide Web Conference: Mosaic and the Web
Conference Date: 17-20 Oct. 1994 Conference Location: Chicago, IL, USA
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Applications (A); Experimental (X)
Abstract: This paper explores the idea of harnessing computer networks to overcome the knowledge acquisition bottleneck. We introduce the idea of a CYLINA (cyberspace leveraged intelligent agent)-an intelligent system that gains knowledge/information through interactions with a large population of network users. CYLINAs rely on small, incremental contributions from a large population of knowledge experts. We consider potential **applications** for CYLINAs, then focus on Auto-FAQ, an experimental system currently under **development** at GTE Laboratories. Auto-FAQ is a question-answering system. Its intent is to make information typically found in USENET News FAQs much more accessible. It has many other uses as well. Users **ask** questions in natural language **forms** . These questions index directly into the systems infobase. Infobase entries are question-answer pairs. Answers can be raw text, URLs, or links into existing entries in the system`s infobase. By using the system recursively, users can explore entire **subjects** with a series of questions. Facilities exist to tag gaps in the systems knowledge base. When a gap is found, it is posted to a public list. Individuals in the **cyberspace community** can **search** the list, volunteer expertise, and fill in gaps as appropriate. A version of Auto-FAQ is currently operating on a private network at GTE Laboratories. The system is currently able to answer basic questions about itself, WWW, and Mosaic. Future plans are to make Auto-FAQ and its associated **software** available on the global Internet. (0 Refs)
Subfile: C
Descriptors: computer networks; cooperative systems; knowledge acquisition; knowledge based systems
Identifiers: cyberspace leveraging; Auto-FAQ; computer networks; knowledge acquisition bottleneck; cyberspace leveraged intelligent agent; CYLINA; intelligent system; experimental system; GTE Laboratories; question-answering system; USENET News FAQ; natural language; infobase entries; systems knowledge base; private network; WWW; Mosaic; global Internet; World Wide Web
Class Codes: C6170K (Knowledge engineering techniques)

14/5/22 (Item 12 from file: 2)
DIALOG(R)File 2:INSPEC

04185203 INSPEC Abstract Number: C9208-7210-012
Title: Building **an** electronic community **system**
Author(s): Schatz, B.R.
Author Affiliation: Arizona Univ., Tucson, AZ, USA
Journal: Journal of Management Information Systems vol.8, no.3 p. 87-107
Publication Date: Winter 1991-1992 Country of Publication: USA
CODEN: JMISEB ISSN: 0742-1222
Language: English Document Type: Journal Paper (JP)
Treatment: Practical (P)
Abstract: An electronic community system encodes and manipulates the range of knowledge and values necessary to function effectively in a community or organization. The knowledge includes both formal data and literature and informal results and news. The manipulation includes both **browsing** through the available knowledge, and recording and sharing interrelationships between the items. A large-scale experiment is underway to **build** an **electronic community** system for the community of scientists studying the nematode worm C. elegans, a model organism in molecular biology. This paper discusses a model for community systems and previous such systems in science, the biology experiment and a previous system, the enabling technology for handling the knowledge, the enabling mechanisms for handling the values, the state of the prototype, and speculations on future **applications** in supporting organizational memory. (17 Refs)
Subfile: C
Descriptors: biology computing; information retrieval systems; information services
Identifiers: information service; ARPANET; electronic community system; molecular biology; organizational memory
Class Codes: C7210 (Information services and centres); C7330 (Biology and medicine)

14/5/33 **(Item 3 from file: 34)**
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

05516422 Genuine Article#: WD675 Number of References: 39
Title: A graphical, self-organizing approach to classifying electronic meeting output
Author(s): Orwig RE (REPRINT) ; Chen HC; Nunamaker JF
Corporate Source: UNIV ARIZONA,KARL ELLER GRAD SCH MANAGEMENT, MIS DEPT, MCCLELLAND HALL/TUCSON//AZ/85721 (REPRINT); UNIV ARIZONA,COLL BUSINESS & PUBL ADM, MIS DEPT/TUCSON//AZ/85721
Journal: JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE, 1997, V48 , N2 (FEB), P157-170
ISSN: 0002-8231 Publication date: 19970200
Publisher: JOHN WILEY & SONS INC, 605 THIRD AVE, NEW YORK, NY 10158-0012
Language: English Document Type: ARTICLE
Geographic Location: USA
Subfile: CC SOCS--Current Contents, Social & Behavioral Sciences;
Journal Subject Category: COMPUTER SCIENCE, INFORMATION SYSTEMS
Abstract: This article describes research in the **application** of a Kohonen Self-Organizing Map (SOM) to the problem of classification of electronic brainstorming output and an evaluation of the results. Electronic brainstorming is one of the most productive **tools** in the Electronic Meeting System called GroupSystems. A major step in group problem solving involves the classification of electronic brainstorming output into a manageable list of concepts, **topics** , or issues that can be further evaluated by the group. This step is problematic due to information overload and the cognitive demand of processing alarge quantity of textual data. This research **builds** upon previous work inautomating the meeting classification process using a Hopfield neural network. Evaluation of the Kohonen output comparing it with Hopfield and human expert output using the same set of data found that the Kohonen SOM performed as well as a human expert in representing term association in the meeting output and outperformed the Hopfield neural network algorithm. In addition, recall of consensus meeting concepts and **topics** using the Kohonen algorithm was equivalent to that of the human expert. However, precision of the Kohonen results was poor, The graphical representation of textual data produced by the Kohonen SOM suggests many opportunities for improving information organization of textual information. Increasing uses of **electronic mail** , computer-based **bulletin board** systems, and world-wide web services present unique challenges and opportunities for a system-aided classification approach. This research has shown that the Kohonen SOM may be used to automatically **create** ''a picture that can represent a thousand (or more) words.''
Identifiers--KeyWord Plus(R): INFORMATION-RETRIEVAL; VOCABULARY PROBLEM; NEURAL NETWORKS; SYSTEMS
Research Fronts: 95-0540 002 (**SOFTWARE** REUSE; PROBABILISTIC INFORMATION-RETRIEVAL; TOPICAL RELEVANCE RELATIONSHIPS; MEDLINE **SEARCHING** ; MODELING COORDINATION; OBJECT-ORIENTED TECHNOLOGY)
95-2040 002 (GROUP DECISION-SUPPORT SYSTEMS; COMPUTER-MEDIATED COMMUNICATION; **ELECTRONIC MAIL** ; SOCIAL INFORMATION; ORGANIZATIONAL MEETINGS; HUMANITIES SCHOLARS)
95-0851 001 (NEURAL NETWORKS; HOPFIELD MODEL; MAPPING COMBINATORIAL OPTIMIZATION PROBLEMS)
95-0977 001 (AGRAMMATIC COMPREHENSION; DISORDERED LANGUAGE; LEXICAL BINDING; ENGLISH PARTICIPLE **CONSTRUCTIONS**)
95-6976 001 (NEURAL NETWORKS; PERCEPTRON LEARNING; ARTIFICIAL EARTHQUAKE PRECURSORS)
95-7430 001 (NEURAL NETWORKS; SELF-ORGANIZING FEATURE MAPS; 2 SOFT RELATIVES OF LEARNING VECTOR QUANTIZATION)
95-7897 001 (NEURAL NETWORKS; COMPUTATIONAL ELEMENTS IN LIVING CELLS; TERNARY LOGIC MODEL)
Cited References:

"web communities" software queries

Web > all

search clear Feeling Lucky

Exact Phrase:

Any of the Words:

Without the Words:

Results only from the domain

File Format: only all

Occurrence: anywhere in the page

Date

in the last: (anytime)

between: January 1 1995

and January 1 2000

Open results in: this window

Duplicates Filter: on

Safesearch: Off

Results: 10

Country: all

Language: all

Keyboard: à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ø ù ú û ü ý þ

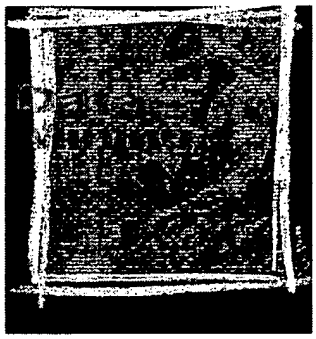
The Google™ Ultimate Interface - from the creator of Fagan Finder

>> make this my homepage << This site is not endorsed by Google.

Like this tool? See also:

Fagan Finder, Translation Wizard, URLinfo, Speed Browse, All About RSS, and Blog Search Engines.

Mining the Web's Link Structure



Sifting through the growing mountain of Web data demands an increasingly discerning search engine, one that can reliably assess the quality of sites, not just their relevance.

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The Web is a hypertext body of approximately 300 million pages that continues to grow at roughly a million pages per day. Page variation is more prodigious than the data's raw scale: Taken as a whole, the set of Web pages lacks a unifying structure and shows far more authoring style and content variation than that seen in traditional text-document collections. This level of complexity makes an "off-the-shelf" database-management and information-retrieval solution impossible.

To date, index-based search engines for the Web have been the primary tool by which users search for information. The largest such search engines exploit technology's ability to store and index much of the Web. Such engines can therefore build giant indices that let you quickly retrieve the set of all Web pages containing a given word or string.

Experienced users can make effective use of such engines for tasks that can be solved by searching for tightly constrained keywords and phrases. These search engines are, however, unsuited for a wide range of equally important tasks. In particular, a topic of any breadth will typically contain several thousand or million relevant Web pages. Yet a user will be willing, typically, to look at only a few of these pages.

How then, from this sea of pages, should a search engine select the *correct* ones—those of most value to the user?

AUTHORITATIVE WEB PAGES

First, to distill a large Web search topic to a size that makes sense to a human user, we need a means of identifying the topic's most definitive or authoritative Web pages. The notion of authority adds a crucial second dimension to the concept of relevance: We wish to locate not only a set of relevant pages, but also those relevant pages of the highest quality.

Second, the Web consists not only of pages, but hyperlinks that connect one page to another. This hyperlink structure contains an enormous amount of latent human annotation that can help automatically infer notions of authority. Specifically, the creation of a hyperlink by the author of a Web page represents an implicit *endorsement* of the page being pointed to; by mining the collective judgment contained in the set of such endorsements, we can gain a richer understanding of the relevance and quality of the Web's contents.

To address both these parameters, we began development of the Clever system[1-3] three years ago. Clever is a search engine that analyzes hyperlinks to uncover two types of pages:

- authorities, which provide the best source of information on a given topic; and
- hubs, which provide collections of links to authorities.

In this article, we outline the thinking that went into Clever's design, report briefly on a study that compared Clever's performance to that of Yahoo and AltaVista, and examine how our system is being extended and updated.

FINDING AUTHORITIES

You could use the Web's link structure in any of several ways to infer notions of authority—some much more effective than others. Because the link structure implies an underlying social structure in the way that pages and links are created, an understanding of this social organization can provide us with the most leverage. Our goal in designing algorithms for mining link information is to develop techniques that take advantage of what we observe about the Web's intrinsic social organization.

Search obstacles

As we consider the types of pages we hope to discover, and to do so automatically, we quickly confront some difficult problems. First, it is insufficient to apply purely text-based methods to collect many potentially

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relevant pages, and then comb this set for the most authoritative ones. For example, were we to look for the Web's main search engines, we would err badly if we searched only for "search engines." Although the set of pages containing this term is enormous, it does not contain most of the natural authorities we would expect to find, such as Yahoo, Excite, InfoSeek, and AltaVista. Similarly, we cannot expect Honda's or Toyota's home pages to contain the words "Japanese automobile manufacturers," nor that Microsoft's or Lotus' home pages will contain the words "software companies." Authorities are seldom particularly self-descriptive. Large corporations design their Web pages carefully to convey a certain feel and project the correct image—a goal that might differ significantly from that of actually describing the company. Thus, people outside a company frequently create more recognizable and sometimes better judgments about it than does the company itself.

Working with hyperlink information causes difficulties as well. Although many links represent the type of endorsement we seek—for example, a software engineer whose home page links to Microsoft and Lotus—others are created for reasons that have nothing to do with conferring authority. Some links exist purely for navigational purposes: "Click here to return to the main menu." Others serve as paid advertisements: "The vacation of your dreams is only a click away." We hope, however, that in an *aggregate* sense, over a large enough number of links, our view of links as conferring authority will hold.

Modeling authority conferral

How can we best model the way in which authority is conferred on the Web? Clearly, when commercial or competitive interests are at stake, most organizations will perceive no benefit from linking directly to one another. For example, AltaVista, Excite, and InfoSeek may all be authorities for the topic "search engines," but will be unlikely to endorse one another directly.

If the major search engines do not explicitly describe themselves as such, how can we determine that they are indeed the most authoritative pages for this topic? We could say that they are authorities because many relatively anonymous pages, clearly relevant to "search engines," link to AltaVista, Excite, and Infoseek. Such pages are a recurring Web component: hubs that link to a collection of prominent sites on a common topic. Hub pages appear in a variety of forms, ranging from professionally assembled resource lists on commercial sites to lists of recommended links on individual home pages. These pages need not be prominent themselves, or even have any links pointing to them. Their distinguishing feature is that they are potent conferrers of authority on a focused topic. In this way, they actually form a symbiotic relationship with authorities: A good authority is a page pointed to by many good hubs, while a good hub is a page that points to many good authorities.[3]

This mutually reinforcing relationship between hubs and authorities serves as the central theme in our exploration of link-based methods for search, the automated compilation of high-quality Web resources, and the discovery of thematically cohesive Web communities.

We view the Web as a directed graph, consisting of a set of nodes with directed edges between certain node pairs.

HITS: COMPUTING HUBS AND AUTHORITIES

The HITS (Hyperlink-Induced Topic Search) algorithm[3] computes lists of hubs and authorities for Web search topics. Beginning with a search topic, specified by one or more query terms, the HITS algorithm applies two main steps:

- a sampling component, which constructs a focused collection of several thousand Web pages likely to be rich in relevant authorities; and
- a weight-propagation component, which determines numerical estimates of hub and authority weights by an iterative procedure.

HITS returns as hubs and authorities for the search topic those pages with the highest weights.

We view the Web as a directed graph, consisting of a set of nodes with directed edges between certain node pairs. Given any subset S of nodes, the nodes induce a subgraph containing all edges that connect two nodes in S. The HITS algorithm starts by constructing the subgraph in which we will search for hubs and authorities. Our goal is to have a subgraph rich in relevant, authoritative pages.

To construct such a subgraph, we first use the query terms to collect a root set of pages—say, 200—from an index-based search engine. We do not expect that this set necessarily contains authoritative pages. However, since many of these pages are presumably relevant to the search topic, we expect at least some of them to have links to most of the prominent authorities. We therefore expand the root set into a base set by including all the pages that the root-set pages link to, and all pages that link to a page in the root set, up to a designated size cutoff.

This approach follows our intuition that the prominence of authoritative pages derives typically from the endorsements of many relevant pages that are not, in themselves, prominent. We restrict our attention to this base set for the remainder of the algorithm. We find that this set typically contains from 1,000 to 5,000 pages, and that hidden among these are many pages that, subjectively, can be viewed as authoritative for the search topic.

Our techniques for uncovering authorities and hubs can uncover Web communities, defined by a specific interest, that even a human-assisted search engine may overlook.

We work with the subgraph induced by the base set, with one modification. We find that links between two pages with the same Web domain frequently serve a purely navigational function, and thus do not confer authority. By "Web domain," we mean simply the first level in the URL string associated with a page. We therefore delete all links between pages with the same domain from the subgraph induced by the base set, and then apply the remainder of the algorithm to this modified subgraph.

We extract good hubs and authorities from the base set by giving a concrete numerical interpretation to our intuitive notions of authorities and hubs. We associate a nonnegative authority weight x_p and a nonnegative hub weight y_p with each page $p \in V$. We are interested in the relative values of these weights only, not their actual magnitudes. In our manipulation of the weights, we apply a normalization so that their total sum remains bounded. The actual choice of normalization does not affect the results—we maintain the invariant that the squares of all weights sum to 1. A page p with a large weight x_p will be viewed as a "better" authority, while a page with a large weight y_p will be viewed as a "better" hub. Since we do not impose any a priori estimates, we set all x and y values to a uniform constant initially; we will see later, however, that the final results are essentially unaffected by this initialization.

We now update the authority and hub weights as follows. If a page is pointed to by many good hubs, we would like to increase its authority weight. Thus we update the value of x_p, for a page p, to be the sum of y_q over all pages q that link to p:

$$x_p = \sum_{q \text{ such that } q \to p} y_q, \quad (1)$$

where the notation $q \to p$ indicates that q links to p. In a strictly dual fashion, if a page points to many good authorities, we increase its hub weight via

$$y_p = \sum_{q \text{ such that } p \to q} x_q. \quad (2)$$

There is a more compact way to write these updates, and it sheds more light on what occurs mathematically. Let us number the pages $\{1, 2, \ldots, n\}$ and define their *adjacency matrix* A to be the $n \times n$ matrix whose $(i,j)^{\text{th}}$ entry is equal to 1 if page i links to page j, and is 0 otherwise. Let us also write the set of all x values as a vector $x = (x_1, x_2, \ldots, x_n)$, and similarly define $y = (y_1, y_2, \ldots, y_n)$. Then our update rule for x can be written as $x \leftarrow A^T y$ and our update rule for y can be written as $y \leftarrow Ax$. Unwinding these one step further, we have

$$x \leftarrow A^T y \leftarrow A^T A x = (A^T A)x \quad (3)$$

and

$$y \leftarrow Ax \leftarrow AA^T y = (AA^T)y. \quad (4)$$

Thus, the vector x after multiple iterations is precisely the result of applying the power iteration technique to A^TA: We multiply our initial iterate by larger and larger powers of A^TA. Linear algebra tells us that this sequence of iterates, when normalized, converges to the principal eigenvector of A^TA. Similarly, we discover that the sequence of values for the normalized vector y converges to the principal eigenvector of AA^T. Gene Golub and Charles Van Loan[4] describe this relationship between eigenvectors and power iteration in detail.

Power iteration will converge to the principal eigenvector for any *nondegenerate* choice of initial vector—in our case, for example, for any vector whose entries are all positive. This says that the hub and authority weights we compute are truly an intrinsic feature of the linked pages collected, not an artifact of our choice of initial weights or the tuning of arbitrary parameters. Intuitively, the pages with large weights represent a very *dense* pattern of linkage, from pages of large hub weight to pages of large authority weight.

Finally, HITS outputs a short list consisting of the pages with the largest hub weights and the pages with the largest authority weights for the given search topic. Once the root set has been assembled, HITS is a purely link-based computation with no further regard to the query terms. Nevertheless, HITS provides surprisingly good search results for a wide range of queries. For example, when tested on the sample query "search engines," HITS returned the top authorities—Yahoo, Excite, Magellan, Lycos, and AltaVista—even though none of these pages contained the phrase "search engines" at the time of the experiment. Results such as this confirm our intuition that in many cases the use of hyperlinks can help circumvent some of the difficulties inherent in purely text-based search methods.

Our techniques for uncovering authorities and hubs provide a further benefit. As the "Trawling the Web for Emerging Cybercommunities" sidebar shows, our algorithms can uncover Web communities, defined by a specific interest, that even a human-assisted search engine like Yahoo may overlook.

COMBINING CONTENT WITH LINK INFORMATION

Although relying extensively on links when searching for authoritative pages offers several advantages, ignoring textual content after assembling the root set can lead to difficulties. These difficulties arise from certain features of the Web that deviate from the pure hub-authority view:

- On narrowly focused topics, HITS frequently returns good resources for a more general topic. For instance, the Web does not contain many resources for skiing in Nebraska; a query on this topic will typically generalize to Nebraska tourist information.
- Since all the links out of a hub page propagate the same weight, HITS sometimes drifts when hubs discuss multiple topics. For instance, a chemist's home page may contain good links not only to chemistry resources, but also to resources for her hobbies and regional information for her hometown. In such cases, HITS will confer some of the "chemistry" authority onto authorities for her hobbies and town, deeming these authoritative pages for chemistry.
- Frequently, many pages from a single Web site will take over a topic simply because several of the pages occur in the base set. Moreover, pages from the same site often use the same HTML design template, so that in addition to the information they give on the query topic, they may all point to a single popular site that has little to do with the query topic. This inadvertent topic hijacking can give a site too large a share of the authority weight for the topic, regardless of the site's relevance.

System heuristics

The Clever system addresses these issues by replacing the sums of Equations 1 and 2 with weighted sums, assigning to each link a nonnegative weight. The weight assigned depends in several ways on the query terms and the endpoints of the link. Together with some additional heuristics, weighting helps mitigate HITS' limitations.

The text that surrounds hyperlink definitions (hrefs) in Web pages is often referred to as *anchor text*. In our setting, we choose to use anchor text to weight the links along which authority is propagated. A typ-

Trawling the Web for Emerging Cybercommunities

The Web harbors many communities—groups of content creators who share a common interest that manifests itself as a set of Web pages. Though many communities are defined explicitly—newsgroups, resource collections in portals, and so on—many more are implicit. Using a subgraph-enumeration technique called trawling, we discovered fine-grained communities numbering in the hundreds of thousands—many more than the number of portals and newsgroup topics. The following communities are a sampling of those we have extracted from the Web:

- people interested in Hekiru Shiina, a Japanese pop singer;
- people who maintain information about fire brigades in Australia; and
- people belonging to Turkish student organizations in the US.

Identifying these communities helps us understand the intellectual and sociological evolution of the Web. It also helps provide detailed information to groups of people with certain focused interests. Owing to these communities' astronomical number, embryonic nature, and evolutionary flux, they are hard to track and find through sheer manual effort. Thus, when uncovering communities, we treat the Web as a huge directed graph, use graph structures derived from the basic hub-authority-linkage pattern as a community's "signature," and systematically scan the Web graph to locate such structures.

We begin with the assumption that thematically cohesive Web communities contain at their core a dense pattern of linkage from hubs to authorities. The pattern ties the pages together in the link structure, even though hubs do not necessarily link to hubs, and authorities do not necessarily link to authorities. We hypothesize that this pattern is a characteristic of both well-established and emergent communities. To frame this approach in more graph-theoretic language, we use the notion of a directed bipartite graph—one whose nodes can be partitioned into two sets A and B such that every link in the graph is directed from a node in A to a node in B. Since the communities we seek contain directed bipartite graphs with a large density of edges, we expect many of them to contain smaller bipartite subgraphs that are in fact complete: Each node in A has a link to each node in B.

Using a variety of pruning algorithms,[1] we can enumerate all such complete bipartite subgraphs on the Web using only a standard desktop PC and about three days of runtime. In our experiments to date, we have used an 18-month-old crawl of the Web provided by Alexa (www.alexa.com), a company that archives Web snapshots. The process yielded about 130,000 complete bipartite graphs in which three Web pages all pointed to the same set of three other Web pages.

Were these linkage patterns coincidental? Manual inspection of a random sample of about 400 communities suggests otherwise: Fewer than five percent of the communities we discovered lacked an apparent unifying topic. These bipartite cliques could then be fed to our HITS algorithms. These algorithms "expanded" the cliques to many more Web pages from the same community.

Moreover, Yahoo does not list about 25 percent of these communities, even today. Of those that do appear, many are not listed until the sixth level of the Yahoo topic tree. These observations lead us to believe that trawling a current copy of the Web will result in the discovery of many more communities that will become explicitly recognized in the future.

Reference

1. S.R. Kumar et al., "Trawling Emerging-Cyber-Communities Automatically," *Proc. 8th World Wide Web Conf.*, Elsevier Science, Amsterdam, 1999, pp. 403-415.

Our study results suggest that Clever can be used to compile large topic taxonomies automatically.

ical example shows why we do so: When we seek authoritative pages on chemistry, we might reasonably expect to find the term "chemistry" in the vicinity of the tails—or anchors—of the links pointing to authoritative chemistry pages. To this end, we boost the weights of links in whose anchor—a fixed-width window—query terms occur.

We base a second heuristic on breaking large hub pages into smaller units. On a page containing many links, it is likely that not all links focus on a single topic. In such situations it becomes advantageous to treat contiguous link subsets as minihubs, or pagelets; we can then develop a hub score for each pagelet, down to the level of single links. We hypothesize that contiguous sets of links on a hub page focus more tightly on a single topic than does the entire page. For instance, a page may be a good hub for the general topic of "cars," but different portions of it may cater to the topics of "vintage cars" and "solar-powered cars."

We apply one further set of modifications to HITS. Recall that HITS deletes all links between two pages within the same Web domain. Because we work with weighted links, we can address this issue through our choice of weights. First, we give links within a common domain low weight, following the rationale that authority should generally be conferred globally rather than from a local source on the same domain. Second, when many pages from a single domain participate as hubs, we scale down their weights to prevent a single site from becoming dominant.

All these heuristics can be implemented with minimal effort and without significantly altering the mathematics of Equations 1 through 4. The sums become weighted sums, and matrix A now has nonnegative real-valued entries rather than just 0s and 1s. As before, the hub and authority scores converge to the components of the principal eigenvectors of AA^T and A^TA, respectively. In our experience, the relative values of the large components in these vectors typically resolve themselves after about five power iterations, obviating the need for more sophisticated eigenvector computation methods.

COMPARING CLEVER WITH OTHER SEARCH ENGINES

How do the resources computed by Clever compare with those found by other methods? We have conducted several user studies that compare Clever's compilations with those generated by AltaVista (www.altavista.com), a term-index engine, and by Yahoo (www.yahoo.com), a manually compiled topic taxonomy in which a team of human ontologists create resource lists.

In one such study,[2] which compares Clever with Yahoo and AltaVista, we began with a list of 26 broad search topics. For each topic, we took the top 10 pages from AltaVista, the top five hubs and five authorities returned by Clever, and a random set of 10 pages from Yahoo's most relevant node or nodes. We then interleaved these three sets into a single topic list, masking which method produced which page. Next, we assembled 37 users, who were required to be familiar with using Web browsers but who were not experts in computer science or in the 26 search topics. We then asked the users to visit pages from the topic lists and rank them as "bad," "fair," "good," or "fantastic," in terms of the pages' utility in providing information about the topic. This yielded 1,369 responses in all, which were then used to assess the relative quality of Clever, Yahoo, and AltaVista on each topic. AltaVista failed to receive the highest evaluation for any of the 26 topics. For the other search engines, we obtained the following results:

- For 31 percent of the topics, Yahoo and Clever received evaluations equivalent to each other within a threshold of statistical significance;
- for 50 percent, Clever received a higher evaluation; and
- for the remaining 19 percent, Yahoo received the higher evaluation.

In masking the source from which each page was drawn, this experiment denied Yahoo one clear advantage of a manually compiled topic list: the editorial annotations and one-line summaries that give powerful cues for deciding which link to follow. We did this deliberately because we sought to isolate and study the power of different paradigms for resource finding, rather than for the combined task of compilation and presentation. In an earlier study[1] we did not mask these annotations, and Yahoo's combination of links and presentation beat an early version of Clever.

CONSTRUCTING TAXONOMIES SEMIAUTOMATICALLY

Yahoo's large taxonomy of topics consists of a subject tree, each node of which corresponds to a particular topic and which is populated by relevant pages. Our study results suggest that Clever can be used to compile such large topic taxonomies automatically.

Suppose we are given a tree of topics designed by domain experts. The tree can be specified by its topology and the labels on its nodes. We wish to populate each node of the tree with a collection of the best hubs and authorities. The following paradigm emerges: If we can effectively describe each node of the tree as a query to Clever, the Clever engine could then populate the node as often as we please. For instance, the

Assigning Web Pages to Categories

In addition to finding hubs, authorities, and communities, hyperlinks can be used to categorize Web pages. Categorization is a process by which a system learns from examples to assign documents to a set of predefined topic categories such as those found in a taxonomy. Hyperlinks contain high-quality semantic clues to a page's topic; these clues are lost when the links are processed by a purely term-based categorizer. Exploiting this link information is challenging, however, because it is highly noisy. Indeed, we have found that naive use of terms in a document's link neighborhood can *degrade* accuracy.

HyperClass[1] embodies one approach to this problem, making use of robust statistical models such as Markov random fields (MRFs) together with a relaxation labeling technique. HyperClass obtains improved categorization accuracy by exploiting link information in the neighborhood around a document. The MRF framework applies because pages on the same or related topics tend to be linked more frequently than those on unrelated topics. Even if none of the linked pages' categories are known initially, you can obtain significant taxonomy improvement using relaxation labeling, wherein you iteratively adjust the category labels of the linked pages and of the page to be categorized until you find the most probable configuration of class labels. In experiments performed[1] using preclassified samples from Yahoo and the US Patent Database (www.ibm.com/patents), HyperClass with hyperlinks cut the patent error rate by half and the Yahoo documents error rate by two thirds.

HyperClass is also used in a focused Web crawler[2] designed to search for pages on a particular topic or set of topics only. By categorizing pages as it crawls, the focused crawler does more than filter out irrelevant pages—it also uses the associated relevance judgment, as well as a rank determined by a version of the Clever algorithm, to set the crawling priority of the outlinks on the pages it finds.

References

1. S. Chakrabarti, B. Dom, and P. Indyk, "Enhanced Hypertext Classification Using Hyper-links," *ACM SIGMOD Int'l Conf. Management of Data*, ACM Press, New York, 1998, pp. 307-318.
2. S. Chakrabarti, B. Dom, and M. van den Berg, "Focused Crawling: A New Approach for Topic-Specific Resource Discovery," *Proc. 8th World Wide Web Conf.*, Elsevier Science, Amsterdam, 1999, pp. 545-562.

resources at each node could be refreshed on a nightly basis following the one-time human effort of describing the topics. How, then, should we describe a topic node to Clever?

Most simply, we may take the name or label of the node as a query term. More generally, we may wish to use the descriptions of other nodes on the path to the root. For instance, if the topic headings along a root-to-leaf path are Business/Real Estate/Regional/United States/Oregon, the query "Oregon" is not accurate; we might prefer instead the query "Oregon real estate."

Additionally, we may provide some exemplary authority or hub pages for the topic. For instance, the sites www.att.com and www.sprint.com may be exemplary authority pages for the topic "North American telecommunications companies." In practice, we envision a taxonomy administrator first trying a simple text query to Clever. Often this query will yield a good collection of resources, but other times Clever may return a mix of high-quality and irrelevant pages. In such cases, the taxonomy administrator may highlight some of the high-quality pages in the Clever results as exemplary hubs, exemplary authorities, or both. This is akin to the well-studied technique of relevance feedback in information retrieval.

To take advantage of exemplary pages, we add an exemplary hub to the base set, along with all pages that it points to, and then increase the weights of the links emanating from the exemplary hub in the iterative computation. We treat exemplary authorities similarly, except that instead of adding to the base set any page pointing to an exemplary authority—a heuristic found to pull in too many irrelevant pages—we add any page pointing to at least *two* exemplary authorities. We use a similar heuristic to delete from the base set user-designated "stop-sites" and their link neighborhoods. This is typically necessary because of the overwhelming Web presence of certain topics. For instance, if our topic is Building and Construction Supplies/Doors and Windows, the "Windows" keyword makes it difficult to ignore Microsoft. Stop-siting www.microsoft.com eliminates this concern.

Thus, we may envision a topic node being described to Clever as a combination of query terms, exemplified authority and hub pages, and, optionally, stop-sites. We have developed a Java-based graphical user interface—called "TaxMan," for Taxonomy Manager—to administer such taxonomy descriptions. Using this tool, we have constructed taxonomies with more than a thousand topics. We have benchmarked both the time spent in creating these taxonomies and the resultant quality of using simple text-only queries versus a combination of text queries and exemplary Web pages. In our study, we found that the average time spent per node grows from about seven seconds to roughly three minutes when you move to a combination of text and exemplary page queries. Outside users quantified the increase in quality by reporting that—when comparing the pages generated using exemplaries to pages generated by textual queries—they considered eight percent more of the exemplary pages to be good link sources.

The "Assigning Web Pages to Categories" sidebar describes how hyperlinks can be used to establish clearer taxonomy categories as well.

CITATION ANALYSIS

The mining of Web link structures has intellectual antecedents in the study of social networks and citation analysis.[5] The field of citation analysis has developed several link-based measures of scholarly papers' importance, including the impact factor and influence weights.[5] These measures in effect identify authorita-

Our analysis of hyperlink topology focuses on the extraction of densely connected regions in the link structure.

tive sources without introducing the notion of hubs. The view of hubs and authorities as dual sets of important documents is inspired by the apparent nature of content creation on the Web, and indicates some of the deep contrasts between Web and scholarly literature content.

The methodology of influence weights from citation analysis relates to a link-based search method developed by Sergey Brin and Lawrence Page.[6] They used this method as the basis for their Google Web search engine. Google first computes a score, called the PageRank, for every page indexed. The score for each page is the corresponding component of the principal eigenvector of a matrix **B**, which can be viewed as the adjacency matrix **A** with a very small constant added to each entry. Given a query, Google returns pages containing the query terms, ranked in order of these pages' PageRanks.

The actual implementation of Google incorporates several additional heuristics, similar in intent and spirit to those used for deriving Clever from HITS. Google focuses on authoritative pages, however, while Clever seeks both authorities *and* good hub pages. Some hub pages may have few or no links into them, giving them low PageRank scores and making it unlikely that Google would report them. Several participants in our user studies suggested that good hubs are especially useful when trying to learn about a new topic, but less so when seeking a very specific piece of information. Google and Clever also differ in their behavior toward topics with a commercial theme. A company's Web-page description of itself may use terms and language different from these that a user might search for. Thus, a direct search for "mainframes" in Google would not return IBM's home page, which does not contain the term "mainframes." Yet IBM would still be pulled in by Clever because of the many hub pages that describe IBM as a mainframe manufacturer.

In independent work, Krishna Bharat and Monika R. Henzinger[7] have given several other extensions to the basic HITS algorithm, substantiating their improvements via a user study. For instance, their paper was the first to describe the modification in which the weights of multiple links from within a site are scaled down.

We believe the mining of Web link topology has the potential for beneficial overlap with several areas, including the field of information retrieval.[8] Mining well-structured relational data offers another possibility. Extracting from an unstructured medium such as the Web a structure of the kind that succumbs to traditional database techniques[9] presents a considerable challenge. We hope that the techniques described here represent a step toward meeting this challenge. ❖

References

1. S. Chakrabarti et al., "Automatic Resource Compilation by Analyzing Hyperlink Structure and Associated Text," *Proc. 7th World Wide Web Conf.*, Elsevier Science, Amsterdam, 1998, pp. 65-74.
2. S. Chakrabarti et al., "Experiments in Topic Distillation," *SIGIR Workshop Hypertext Information Retrieval*, ACM Press, New York, 1998, http://www.almaden.ibm.com/cs/k53/clever.html.
3. J.M. Kleinberg, "Authoritative Sources in a Hyperlinked Environment," *Proc. 9th ACM-SIAM Symp. Discrete Algorithms*, ACM Press, New York and SIAM Press, Philadelphia, 1998, pp. 668-677.
4. G. Golub and C.F. Van Loan, *Matrix Computations*, Johns Hopkins University Press, Baltimore, 1989.
5. L. Egghe and R. Rousseau, *Introduction to Informetrics*, Elsevier Science, Amsterdam, 1990.
6. S. Brin and L. Page, "The Anatomy of a Large Scale Hypertextual Web Search Engine," *Proc. 7th World Wide Web Conf.*, Elsevier Science, Amsterdam, 1998, pp. 107-117.
7. K. Bharat and M.R. Henzinger, "Improved Algorithms for Topic Distillation in a Hyperlinked Environment," *Proc. SIGIR 98*, ACM Press, New York, 1998, pp. 104-111.
8. G. Salton and M. McGill, *Introduction to Modern Information Retrieval*, McGraw-Hill, New York, 1983.
9. D. Florescu, A. Levy, and A. Mendelzon, "Database Techniques for the World Wide Web: A Survey," *SIGMOD Record*, Vol. 27, No. 3, 1998, pp. 59-74.

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Virtual Communities:A Brief History

by

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With the introduction of any new technology there are unintended social effects which occur as a result of society's reaction to the new technology. Kiesler states that "the long run social effects of a new technology are not the intended ones, but have more to do with the technology's indirect demands on our time and attention, and with the way it changes our work habits and our interpersonal relations."(47). The reactions to the initial introduction of the technology will in turn effect the way the technology develops. If technology can be adapted to better fit our work habits and interpersonal relations, users will demand change by means of their use or dis-use of the technology. In the development of computer networks people have used certain features more extensively than others, which has forced programmers to further develop these features, though this may not have been their initial intention. In the case of computer networks, users have demanded more functions which would allow them to communicate with each other (e-mail, conferences) and as a result of these improved functions, virtual communities have been able to form. The first community was formed on APRAnet the first computer network, as communication became easier due to the development of more sophisticated communication functions. In order to look at examples of the formations of early networks and communities, it is necessary to discuss what exactly constitutes a community.

Community becomes a more abstract concept within computer networks due to the lack of real, physical boundaries. "The concept of community commonly refers to a set of social relationships that operate within specified boundaries or locales, but community has an ideological component as well, in that if refers to a sense of common character, identity or interests"(Fernback and Thompson 3). Here the defining elements of community are the social interactions rather than boundaries. In virtual communities social interaction differs from other types of communities because the interactions are computer-mediated; however, "[t]he way in which people use CMC [computer-mediated communication] always will be rooted in human needs, not hardware or software"(Rheingold 4). Like other communities a virtual community is based on one or more common characteristics or interests of its members. In other words, the social relationships determine if the group is a community, and boundaries and the method of communication determine the type of community.

J.C.R. Licklider and Robert Taylor, research directors for the US Department of Defense, started the research which lead to the development of ARPAnet; the first multisite, packet switched network. ARPAnet was designed to connect with the Advanced Research Projects Agency (ARPA) for the transferring of files and resource sharing. It was a simple services network for sharing news and for many to many synchronous communication. The two main features were the File Transfer Protocol (FTP) and TELNET, a remote login. E-mail, was an afterthought in the development of ARPAnet, but quickly became one of the most popular features of the system.(Quarterman 36-38). By 1980 e-mail capabilities had developed significantly. Bulletin boards were regularly used and Finger and WHOIS programs were developed to help people find e-mail addresses. These improvements of the initial communication tools were done due to demand of the users. Once they were sufficiently developed enough structure existed allowing users to form a community. The first virtual community was on ARPAnet and that was Science Fiction Lovers (SF-LOVERS), started in 1978(Quarterman 47). At first there were attempts to suppress it as it was viewed as a waste of resources; however, this attempt failed setting precedent for the development of future communities.(Rheingold 13).

The creators of APRAnet did not intend the network to be used for the purpose of developing communities. However, Licklider and Taylor did predict that there would be the formation of virtual communities. They thought that the communities would consist of members who were not necessarily close geographically and the binding feature of these communities would be shared interests among the members(Rheingold 13). Though they predicted that there would be the formation of such communities they did not expect these communities to develop on APRAnet because the intended function of the network was for military research, not social development.

Around the same time Licklider and Taylor were planning the APRAnet, a New Left was forming in California. They promoted progressive ideas and an egalitarian society. One faction of the group believed that technological advancement would aid in their struggle for this ideal society. "These technophiliacs thought that the convergence of media, computing and telecommunications would inevitably create the electronic agora - a virtual place where everyone would be able to express their own opinions without fear of censorship"(Barbrook and Cameron 3). This faction of the New Left believed that this convergence of technologies would create an ideal platform for free, uncensored speech. Licklider and Taylor had predicted that the creation of virtual communities would simply be based on shared interests. The New Left took that one step further and hypothesized (or hoped) for radical social change.

Kiesler states that "computer networks may be can-opener technologies, making life a little easier, or they may be something more than that-technologies that change organizations"(47). This statement mirrors the differing ideas of the predictions of the aforementioned groups. Kiesler discusses this issue in 1986 demonstrating that then there was still no clear idea of where this technology would take us. Today there is still room for radical social change; however, "[e]xperientially, community within cyberspace emphasizes a community of interests, usually bounded by the topic under discussion, that can lead to a communal spirit and apparent social bonding"(Fernback and Thompson 5). This is generally what virtual communities are based on today. The technology has developed since the days of ARPAnet and has become more sophisticated to better serve the needs and desires of users. What further social changes will occur are hard to guess. As William Melody states in his article "Electronic Networks and Changing Knowledge" : "Attempts to assess the long-term social implications of technological change in the information and communication field are made especially difficult because of the complex methodological problems associated with network analysis. New information and communication networks grow over time as a result of learning, adaptation through changes in personal habits, and accompanying changes in institutional relations."(269).

References

Barbrook,Richard and Cameron,Andy."The Californian Ideology." Hypermedia Research Center of the University of Westminister, London. Available:http://www.wmin.ac.uk/media/HRC/ci/calif5.html

Fernback, Jan and Thompson, Brad. "Virtual Communities:Abort,Retry,Failure?" Available:http://www.well.com/user/hlr/texts/VCcivil.html

Hardy,H.E. "The History of the Net." Design of Information Systems, University of Michigan, School of Information and Library Studies. December 1994. Available:http://www.eff.org/pub/Net_culture/net.history

Kiesler, Sara."Thinking Ahead". *Harvard Business Review*. January-February 1986:46-59.

Melody, William. "Electronic Networks and Changing Knowledge".*Communication Theory Today*. Ed.

David Crowely and David Mitchell. Stanford:Stanford Press, 1994. 254-273.

Quarterman, John S. "The Global Matrix of Minds". *Global Networks:Computers and International; Communication*. Ed. Linda M. Harasim.Cambridge:The MIT Press, 1993. 35-56.

Rheingold, Howard. "A Slice of My Life in My Virtual Community." Whole Earth Review, 1992. Available:gopher://gopher.well.sf.ca.us:70/00/Community/virtual_communities92

09/934093

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	(("20030120685") or ("23300093404")).PN.	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 10:09
L2	0	("23300093404").PN.	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 10:09
L3	1	("20030093404").PN.	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 11:09
L4	1	("6029195").PN.	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 11:10
L5	1	4 and bulletin	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 11:16
L6	1	"5724567".PN.	USPAT; USOCR	OR	OFF	2005/03/17 11:16
L7	1	"5717923".PN.	USPAT; USOCR	OR	OFF	2005/03/17 11:16
L8	1	"5331554".PN.	USPAT; USOCR	OR	OFF	2005/03/17 11:16
L9	0	("6029195.uref.").PN.	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 11:17
L10	160	"6029195".uref.	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 11:17
L11	132	10 and @ad<"20000825"	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 11:29
L12	5	11 and communities	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 11:29

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	recommending near3 communities	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:27
L2	1	recommending same communities	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:28
L3	1	recommending same bulletin near2 boards	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:29
L4	0	suggesting near3 (bulletin near2 boards)	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:29
L5	0	suggesting same (bulletin near2 boards)	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:29
L6	8	automatic near3 communities	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:32
L7	2	(("5884270") or ("5862223")).PN.	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:33
L8	3186611	search$5 or query$4 or surf$6 or brows$7 or queries	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:35
L9	4485631	create$4 or creat$5 or form or build$5 or construct$5 or start$ or add or forming or develop$7	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:36
L10	2612781	invite$4 or ask or request$6 or contact$4 or match$4 or e-mail$4 or message	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:37
L11	49118	((e or electronic) or (mail or cyber or virtual or on-line or online or internet or web or www or cyberspace)) near3 (gathering or communit$7 or group$4 or club$4 or forum$4 or (bulletin near2 board) or (chat) near3 (group$2 or room$2))	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:42
L12	25823	8 and 9 and 10 and 11	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:51
L13	2398581	9 and 10	US-PGPUB; USPAT; EPO	OR	OFF	2005/03/17 13:51